

Occipitalization of atlas vertebra- A Case report

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Abstract- During routine activities in the department of Anatomy, GSVM, Medical College Kanpur (U.P), an atlanto-occipital fusion was observed in cadaveric skull. The skull used in our study had complete fusion of the atlas vertebra with occipital bone along with ossification of atlanto-occipital membranes. The knowledge of such a fusion may be of importance for radiologists, anaesthetist, orthopedic and neurosurgeons because skeletal abnormalities at the craniocervical junction may result in sudden unexpected death. It can result in dysphagia, dysarthria or torticollis because of compression of cranial nerves. Neurosurgeons should be aware that such an anomaly may exist without any typical symptomatic presentation, and thus serious consequences of upper cervical spinal manipulative therapy may arise when a complete and adequate clinical assessment is missed.

Key Words- Atlanto-occipital fusion, crania-cervical junction, Atlas, Cervical spine.

I. Introduction

The atlanto-occipital joint on each side is located between the superior articular facet of the lateral mass of atlas and condyles of occipital bone. These two bones are also connected by atlanto-occipital membrane, extending from the anterior and posterior arches of the atlas, respectively, to anterior and posterior edges of the foramen magnum. The atlantooccipital joint is synovial in nature and has joint capsule which is thin and loose. The main movement of this joint is of bending, with a slight lateral tilt and rotation of the head(2). Occipitalization of the atlas or atlantooccipital fusion is one of the most common osseous anomalies of the craniovertebral junction[3]. Patients with craniovertebral joint anomalies usually exhibit neurological signs and symptoms no sooner than the second decade(3) [4].

Furthermore, the atlanto-occipital fusion is that not all cases can be easily distinguished from the Arnold-Chiari malformation(5).

II. Case-Report

During post graduate dissection work on 150 adult human skulls of indian origin collected from the department of Anatomy, GSVM Medical College, Kanpur, India, one skull showing occipitalization of Atlas was observed. Both anterior and posterior arches were fused with the occipital bone. In addition the transverse processes of the Atlas were also fused with the occipital bone(Fig-1).

III. Discussion

Fusion of Atlas vertebra with the occipital bone, partial or complete, may occur in 1% of cases so called Atlas assimilation. The occipital bone is derived from basioccipital, exoccipital and supraoccipital portions, all of which surround the foramen magnum [2]. The basiocciput goes on to develop into four occipital somites. The caudal portion of the fourth occipital somite goes on to fuse with the cranial portion of the first cervical somite to form the articular condyles and the tip of the odontoid process. The caudal half of the first cervical somite along with the cranial part of the second cervical somite goes on to form the atlas and the odontoid process of the axis [3]. A paracondylar process represents vestiges of the cranial half of the first cervical sclerotome. This formation is referred to as a caudal shifting (a vertebra taking on the characteristics of its caudal neighbor) where the occipital vertebra separates from the occiput [3]. According to Hensinger [4] patients with occipitalization of the atlas have short neck and restricted neck movements. Symptoms referable to the vertebral artery compression, such as dizziness, seizures, mental deterioration, and syncope may occur alone or in combination with those of the spinal cord compression [4]. Spano and Darling[5] suggest that any morphological and structural alteration of the cervical spine may lead to stenosis or substenosis of the vertebral arterial circulation and hence to brain stem anoxia.

The neurological symptoms and signs of atlanto-occipital fusion can not be distinguished from those of the Arnold Chiari malformation as the pathophysiology of both is essentially the same. Fusion between atlas and occiput occurs anteriorly between the arch and rim of the foramen with some segment of the posterior arch of C1 present in some instances. This fragment can frequently constrict the spinal canal causing intermittent symptoms depending on the position of the head[6]

Wang, Wang, Liu et al. (2009) researched the anomalous vertebral artery in craniovertebral junction with atlantooccipital fusion. They classified four different pathways of the vertebral artery at the cranio vertebral junction with atlanto-occipital fusion were found: Type I, wherein the vertebral artery enters the spinal canal below the C1 posterior arch, and the course of the vertebral artery is below the atlanto-occipital fusion C1 lateral mass; Type II, the vertebral artery enters the spinal canal below the C1 posterior arch, and the course of the vertebral artery is on the posterior surface of the atlanto-occipital fusion C1 lateral mass, or makes a curve on it; Type III, wherein the vertebral artery ascends externally laterally after leaving the axis transverse foramen, enters an osseous foramen created between the atlas and occipital bone, then into the cranium; and Type IV, in which the vertebral artery is absent.

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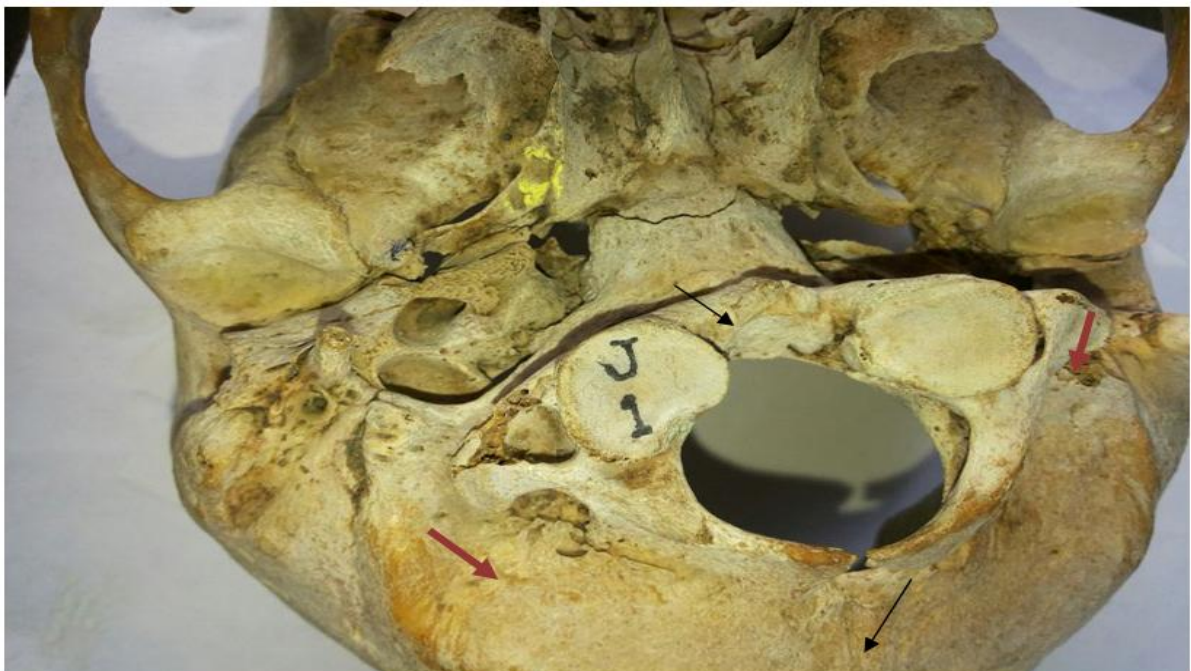


Fig-1 Occipitalization of Atlas Vertebra(Black arrows showing anterior and posterior arch of Atlas vertebra and red arrows showing transverse element).